C·R·E·S®
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT
SPRING 1997

The Nose Knows: Giant Panda Scent Marking

Our many friends and supporters know that a pair of giant pandas arrived at the San Diego Zoo on September 10, 1996. It is less well known that they came here for scientific study. Because giant pandas are so rare—with perhaps 1,000 in the wild and 100 in zoos—we were not at all disappointed when the U.S. Fish and Wildlife Service required a "research" as opposed to a "breeding/exhibit" loan in this case. While breeding will be encouraged, the emphasis will be on understanding how pandas communicate. Under these conditions, the pandas' well-being and research activities take precedence over public viewing, and visitors understand why the pandas need to be off exhibit at times.

In the four months that Bai Yun and Shi Shi have been here, all indications are that they have settled into their new quarters and to the San Diego routine of feeding and care with very few problems. Bai Yun was born at the Wolong Breeding and Research Center in Sichuan Province, China. She had her fifth birthday three days before her arrival in San Diego, and her first estrus was in early May 1996. Shi Shi was born in the wild, and he was nursed back to health at Wolong after suffering severe wounds, probably in a quarrel with another male. We estimate his age to be between 10 and 15 years.

Our focus at CRES will be on the study of giant panda communication and, in particular, the ways in which their sense of smell is used to regulate their social and sexual interactions. Although giant pandas live in communities composed of more or less permanent members, they spend little time in direct social contact. Like other mammals that are inclined to be solitary, they have an elaborate system of scent marking that serves them well. By leaving her scent on a tree trunk or rock, for example, a female will advertise her approaching estrus, and males who investigate the places she has marked become alerted to her mating receptivity. Interestingly, giant pandas have a rather large gland around the anus that produces a dark, sticky exudate, which presumably conveys a fair amount of individual information. The system of posting information via scent marking may be compared to leaving a message on a community bulletin board that is noted by visitors to that location.

Continued on page 2

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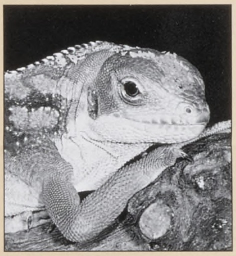
CRES® is operated by the Zoological Society of San Diego.



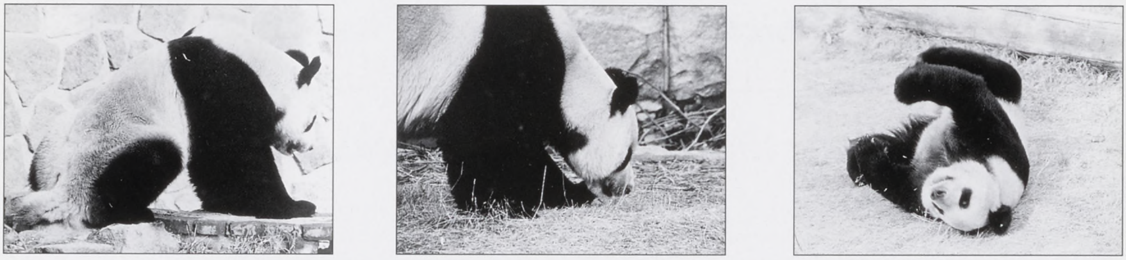
Fijian Iguana
Exciting new species may exist. See page 3.

Adopt an Arctic Fox
Valentine's Day gift helps endangered species. See page 5.

Estate Planning Techniques
Gifts that will keep on giving to CRES. See back cover.

The Nose Knows: Giant Panda Scent Marking

Continued from page 1



Photos by Donald G. Lindburg

CRES researchers study the pandas as they scent mark, sniff the scent, and then roll in the scent, all part of understanding how the animals mark their territory and communicate. Scent marks may also contain information about gender, age, and time of passage through an area.

Of course, the impending estrus of panda females is only one kind of information that may be communicated through the sense of smell. If scent marks also contain information about gender, age, familiarity, time of passage through an area, and/or occupancy of habitat area, then determining what is in a scent mark from an information standpoint is critical: a panda processes this information and decides how to respond to another panda in the area.

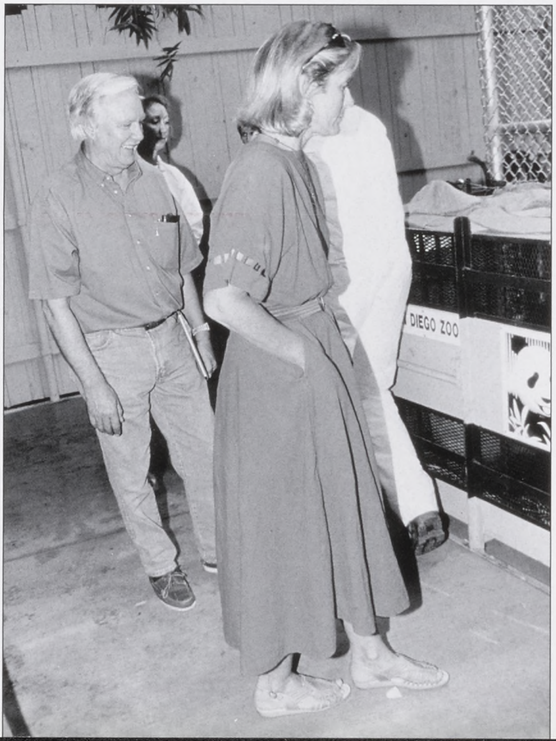
Assuming that scent marks do provide information about individual identity and status, then this should be reflected by variation in their chemical composition. We have collected scent marks from pandas at Wolong and at the Beijing Zoo, and preliminary analysis in our laboratory has revealed approximately 27 compounds (in a single mark), including several fatty acids encountered in other mammalian scent marks. Once a chemical profile is established, then we can begin to look for variation on the basis of the identity and characteristics of individual pandas.

We also hope to apply our knowledge of scent marks to the study and management of the remaining wild giant panda population. For example, scent marks contain DNA and allow researchers to conduct noninvasive studies of genetic relationships within a panda community. They also have potential for censusing wild populations and for encouraging giant pandas to use land corridors connecting fragments of habitat or to recolonize formerly occupied ranges, as would occur in a reintroduction program.

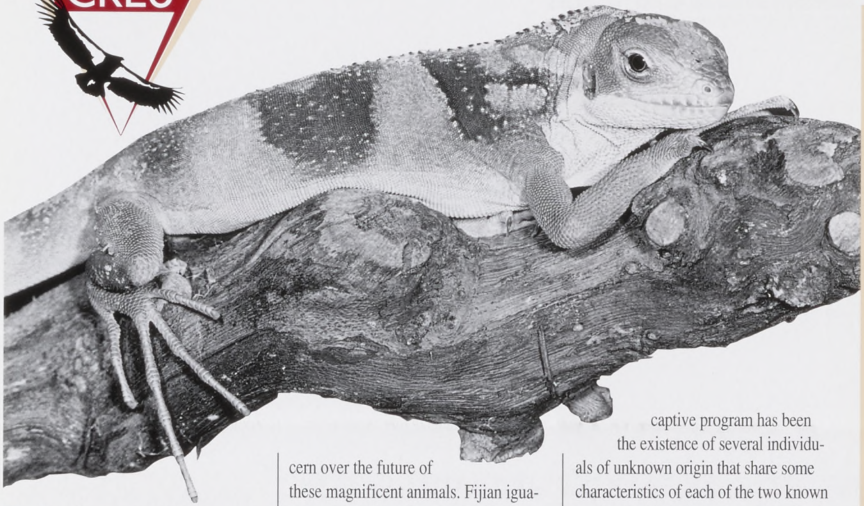
Returning to reproduction for a moment, it is fairly well established that scent marking is to some degree affected by the hormonal state of panda females, and possibly also of males. For this reason, in addition to the behavioral work we have planned, samples of urine and feces from both Bai Yun and Shi Shi are being collected for daily analysis in our endocrine laboratory. Since the female ovulates only once during the entire year, it is important that we understand the relationship of scent marking to internal hormonal changes, if we are to have a reasonable chance at successful reproduction with Bai Yun and Shi Shi. In addition, if males are seasonally spermatogenic, which seems to be the case, then achieving synchronization of readiness to mate by the members of a pair—as described from field studies by scientists George Schaller and Pan Wenshi—is likely to be facilitated by endocrine monitoring.

As we approach our first giant panda mating season this spring, we expect to learn a great deal about the role of scent in encouraging courtship and synchronizing sexual interest between Bai Yun and Shi Shi. If we should have the good fortune to obtain a pregnancy, this will confirm that we, as visually dominated humans, have begun in a modest way to understand and appreciate the complex olfactory world of the giant panda.

—Donald G. Lindburg, Ph.D.
Head of Behavior Division/CRES



Behaviorist Dr. Don Lindburg and endocrinology researcher Nancy Czekala were on hand when the pandas arrived at the Zoo on September 10, 1996.



Comparative Physiology

The endangered iguanas of the Fiji Islands form a remarkably beautiful but also ecologically significant component of the ecosystems they inhabit. Rapidly diminishing habitat and introduced predators have led to considerable concern over the future of these magnificent animals. Fijian iguanas consist of two known species that inhabit exclusive geographic ranges, with only one or the other found on a given island. However, few of the islands have been adequately studied, and it is likely that additional species remain to be discovered and protected.

Over the past decade, the San Diego Zoo's reptile department has been highly successful in propagating the Fijian iguanas. A longstanding issue within the captive program has been the existence of several individuals of unknown origin that share some characteristics of each of the two known species, but they do not correspond clearly to either. To ensure that the opportunity to conserve a potentially genetically unique form is not irretrievably lost, the CRES comparative physiology division, in collaboration with the CRES genetics division and Sydney's Taronga Zoo in Australia, is evaluating the exciting possibility that these distinctive individuals may represent a new, previously undescribed species.

Genetics

Previous genetic studies at CRES conducted by Dr. Yaping Zhang developed powerful new tools for paternity analysis and individual genetic identification of giant pandas by using hair samples. Greater knowledge of the genetic structure of wild populations of giant pandas, including information about migrations and breeding structure (including paternity), can contribute significantly to conservation planning to ensure long-term survival. Mr. Bo Ding, a student of Dr. Zhang, has been working with samples of feces and scent marks obtained from the two giant pandas now at the San Diego Zoo, as well as giant pandas at other locations. Mr. Ding has been successful in amplifying giant panda DNA from samples of their feces and scent marks. This exciting finding opens the way for noninvasive monitoring of the genetic status of giant pandas in the wild, identifying animal movements without resorting to radio collars, and the determination of paternity of baby giant pandas born in the wild.

CRES Grants

The Center for Reproduction of Endangered Species is grateful to the following for their support of imperiled wildlife:

***The Alice C. Tyler Perpetual Trust** has made a $20,000 conservation grant and a $25,000 commitment to genetic and endocrinology studies of the critically endangered giant panda. The grant will enable CRES scientists to continue to develop and validate new laboratory techniques for both reproductive and genetic assessments of giant pandas. **The Heller Foundation of San Diego** has established the Bud Heller Conservation Fellowship for CRES research at the San Diego Wild Animal Park. The first year's $30,000 fellowship will fund research through the CRES endocrinology division. **The Bay Foundation** and **John and Lois Klaas** are contributing toward the purchase of an incubator for vaccine virus production for the CRES infectious diseases division.*

Toy Animals Helping Endangered Animals

Children have enjoyed playing with plastic toys for years— especially when those toys are animal figures. Battat Inc., based in Canada, has created the CRES Collection by the San Diego Zoo®, a wonderful collection of toys that realistically depicts the features of popular wildlife. Polar bears, zebras, and rhinoceroses are just a few of the figures represented in the CRES Collection.

Children learn about the importance of conservation because each animal toy comes with an educational hangtag that explains the worldwide involvement of CRES and its efforts to improve the future of many threatened and endangered animals.

Battat plans to release a new CRES Collection series in 1997, which will introduce many new animals. The CRES Collection can be found in Zoological Society gift shops and other fine specialty stores. Part of the proceeds from the purchase of this Collection directly benefits CRES.

Cans for Critters Recruiters

Are you scolded when you forget to place your empty soda can in the recycle bin? Do you find yourself subconsciously looking for aluminum cans on the side of the street, in parking lots, or your neighbors' yards? Is it almost impossible not to pick up and save a discarded aluminum can? If so, you are not alone! Chances are you may live with or know someone who lives with a highly motivated CRES Canner!

Students from about 40 schools saved, crushed, and redeemed aluminum cans to raise almost $20,000 (that's a lot of cans!) in the 1996 Cans for Critters drive. To reach such incredible numbers, these can-collecting kids recruited the help of communities, organizations, teachers, and family members. Five-year-old Kaitlyn Kaseno of Sorrento Valley Children's Center collected an amazing 6,067 aluminum cans by creating a flier and distributing it to the homes in her neighborhood. The response was as overwhelming as Kaitlyn's success!

saving the earth & endangered animals

cans for critters®

Cans for Critters, approaching its 17th year, is a fun and educational recycling program that enables youngsters to actively contribute to the betterment of our environment and the future of endangered animals. Students can receive prizes, critter visits from the Zoological Society's education department, and participate in the Cans for Critters Jamboree awards celebration hosted at the San Diego Zoo. Proceeds from the program directly benefit CRES in its research projects aimed at improving the chances of survival for many threatened animals.

If you haven't already jumped on the "can" wagon and would like more information on the Cans for Critters program, please call Kim Hopkins in the development department at (619) 685-3272. But hurry— the drive begins on February 24!

Kim Hopkins

Kaitlyn Kaseno collected an amazing 6,067 cans for CRES!

Be as Cunning as a Fox— Adopt Me for Your Favorite Valentine!

The San Diego Zoo is home to three Arctic foxes. These beautiful animals live in the tundralike surroundings of Polar Bear Plunge, where specially cooled sleeping areas are incorporated into their enclosure. The Arctic fox is the only small mammal that lives exclusively above the Arctic Circle and does not move southward with the approach of winter. Its winter coat varies from bluish gray to solid white, while its summer coat is light brown, with distinctly lighter patches at the throat and along the belly.

During the warmer months, the foxes patrol their hunting grounds, feeding on eggs, nestlings, small mammals such as lemmings, and frequently on carrion. In hunting for rodents under the snow, the Arctic fox is guided by its acute sense of smell and hearing; it moves noiselessly over the surface, pounces on its quarry, and seizes the prey in its strong jaws.

YOUR VALENTINE ADOPTION GIFT OF $49 WILL INCLUDE:

- ♥ 13-inch plush Arctic fox
- ♥ Personalized adoption certificate
- ♥ Subscription to *CRES Report*
- ♥ Valentine card to announce your gift

You can make a difference! Contributions to the Adopt-An-Animal program benefit the Zoological Society's Center for Reproduction of Endangered Species and its continuing efforts to learn more about endangered species and their habitats.

NOTE: Naturally, your adopted animal will remain at the Zoo in the care of our professional staff.

ANIMAL ADOPTION APPLICATION

Your Name________________ Telephone________________

☐ **YES,** I want to adopt an Arctic fox:

☐ *For myself* ☐ *As a gift*

Name(s) ________________________________

Address ________________________________

City ____________________ State____ Zip__________

Message for gift card ________________________________

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Additional Arctic fox adoption:

☐ *For myself* ☐ *As a gift*

Name(s) ________________________________

Address ________________________________

City ____________________ State____ Zip__________

Message for gift card ________________________________

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Please charge my:

☐ MasterCard® ☐ VISA® ☐ Discover® ☐ American Express®

Card #____________________ Exp. Date __________

Signature ________________________________

OR, please make checks payable to the Zoological Society of San Diego and mail to: **The Zoological Society of San Diego**, Adopt-An-Animal Program, P.O. Box 271, San Diego, CA 92112.

OR, you may charge your adoption by telephone: call (619) 557-3974 between 8 A.M. and 4 P.M., Monday through Friday.

Orders must reach the San Diego Zoo by February 5 to ensure delivery by Valentine's Day. Special price good through February 28,1997.

(AVC6)

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Gifts that Keep on Giving

If you are making retirement or estate plans, you can help CRES and yourself in many different ways. By using planned giving techniques, you can secure benefits for yourself and also significantly aid CRES. Here are some choices that will offer several mutual advantages.

LIFE INCOME PLANS

A Charitable Remainder Trust is formidable sounding but simple in concept, and you can establish one. With this trust, you can irrevocably transfer cash, securities, or real estate into a C.R.T. and receive lifetime earnings checks. In addition, there are many tax advantages, such as immediate charitable gift income tax deduction, avoidance of capital gains taxes from the sale of appreciated property, and possible reduction or elimination of estate taxes. If you do not want to set up your own fund, you can utilize the Zoological Society's Pooled Income Fund, which provides essentially the same advantages as a personal trust but is as simple as opening a bank account.

LIFE INSURANCE

A very impressive future gift to CRES can be created through life insurance. Premiums paid are deductible if the Society owns the policy, which further reduces the already modest present cost of such a gift arrangement.

REAL ESTATE

Real property of many types can make a great gift with a low cost basis. And real estate can be transferred into charitable trusts to provide you with lifetime income and tax advantages.

SECURITIES

Many types of securities, especially if highly appreciated, can make wonderful charitable gifts. You may deduct the full market value on the date of the gift, not just your basis, and thereby make a substantial immediate gift at a very low actual cost.

I.R.A.

You can make the Zoological Society the primary or contingent beneficiary of your I.R.A. and possibly make a fine future gift to CRES with no actual additional cost above your planned I.R.A. contributions.

Brochures or other information regarding these giving opportunities are yours for the asking with absolutely no obligation. Just phone Patrick O'Reiley, the Society's planned giving director, at (619) 685-3215 and you will receive a prompt response.

CRES REPORT
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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SAN DIEGO ZOO · SAN DIEGO WILD ANIMAL PARK

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